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RESEARCH ON SOME PROBLEMS IN INFORMATION PROCESSING

E. Wong

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U. S. ARMY RESEARCH OFFICE

GRANT DAAG29-74-G-0087

16 December 1973 - 30 June 1977

ELECTRONICS RESEARCH LABORATORY

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University of California, Berkeley
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The research in this grant was conducted in two principal areas: ~~(a)~~ Stochastic models for image processing; and ~~(b)~~ Management of information and databases. Significant progress was achieved in both areas, and a concise description is included.

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This is the final report for "Research on Some Problems in Information Processing," DAAG29-74-G-0087.

As proposed, the research on this grant was conducted in two principal areas:

(a) Stochastic models for image processing;

(b) Management of information and databases.

Significant progress was achieved in both areas, and a concise description of the principal findings is given below. Inasmuch as both of these problem areas continue to be investigated under ARO sponsorship, additional details can be found in the progress reports of grants DAAG29-75-G-0189 and DAAG29-76-G-0245.

One of the difficulties in image processing is the lack of good theoretical models for two-dimensional signals and noise with a concommitant lack of a processing methodology well-founded on theory. A major reason for this is the relatively undeveloped theory of stochastic processes with a multidimensional parameter (i.e., random fields). We have made significant progress in this area by developing a theory of martingales with a two-dimensional parameters. In addition to fundamental results of a mathematical nature, recursive image processing techniques based on the theory have also been obtained.

Beginning in 1974, we undertook to design and implement a major database management system based on the relational data model. Our goal was to achieve both data independence and powerful capabilities in data manipulation and control with an acceptable level of efficiency. The resulting system known as INGRES is now fully operational and has been widely tested in actual use. The impact of INGRES on research in database management both here and elsewhere has been considerable. It

has provided a vehicle for testing important new concepts, and has stimulated additional areas for research. As a pioneering system of its type, it has also served as a bridge between research and practice.

Published Papers

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"A sequential approach to heart-beat interval classification," E. T. Tsui and E. Wong, IEEE Trans. on Information Theory, p. 596, Sept. 1975.

"Recursive filtering for two-dimensional random fields," E. Wong, IEEE Trans. on Information Theory, IT-21, pp. 84-86, Jan. 1975.

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